

LABNOTES *Fall 2001*



NR 149 To Be Revised

The laboratory certification program has received approval to proceed with revisions to the Laboratory Certification and Registration Code (ch. NR 149 Wis. Adm. Code). Laboratories that perform sample analysis under covered programs defined by statute must be certified or registered under ch. NR 149.

The Code revision process started with a brainstorming session of the Laboratory Certification Program staff in early November. The Certification program will then solicit ideas for revision from all the covered programs within the Department of Natural Resources that it serves. An Advisory Committee will provide recommendations to the Certification Program on possible changes to ch. NR 149. The ch. NR 149 Revision Advisory Committee is comprised of members of the Certification Standards Review Council, Department staff, and representatives of additional groups concerned or involved with laboratory operations and certification. Some of the policy issues that will be considered include:

- Revision of test category structure to increase the efficiency of the administration of the code and reflect the changes in other rules and regulations;
- Revision of fee structure to accommodate potential changes in the certification and registration program;
- Incorporation of changes to safe drinking water regulations, effluent toxicity methods manual, and updated editions of analytical methods manuals;
- Improvements in quality control and documentation requirements that better reflect current national trends;
- Revisions of the procedures for obtaining and maintaining certification or registration offered under this program;
- Modification of requirements to analyze reference samples;
- Modification of on-site laboratory evaluation procedures and criteria;
- Improvement and clarification of current enforcement procedures; and
- Overall organization of the code to make it more efficient and improve its clarity.

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NR 149 To Be Revised, continued.

Laboratories are encouraged to bring concerns and suggestions for revisions to an Advisory Committee member. The external members and their represented constituency are:

Advisory Committee Member	Represented Constituency
George Bowman WSLH	State Laboratory of Hygiene
Debbie Cawley Green Bay Metropolitan Sewerage Dist.	Large Municipal Wastewater Plant
Joe Celmer Little Rapids- Shawano Mill	Paper Council
Randy Herwig City of Lodi	Small Municipal Wastewater Plant
Paul Junio TestAmerica, Inc.- Watertown	Commercial Laboratory
David Kollakowsky Wisconsin Electric Power Company	Industrial Laboratory
R.T. Krueger Northern Lakes Service	Wisconsin Environmental Laboratory Association
Marcia A. Kuehl MAKUEHL, Company	Demonstrated Interest in Laboratory Certification
Ruth Klee Marx County of Marathon Health Department	Public Water Utility
Steven Smith BT ² , Inc.	Non-Laboratory Data User
Steven Sobek WI DATCP	Dept. of Agriculture, Trade and Consumer Protection
Amy Tutwiler Davis & Kuelthau, S.C.	Municipal Environmental Group

The first meeting of the ch. NR 149 Advisory Committee will take place in January 2002. It is anticipated that this effort will conclude with a draft rule for public comment in early 2003. Working closely with program management, audit chemists Diane Drinkman and Alfredo Sotomayor will be taking the lead on this effort. Department legal counsel for the ch. NR 149 revisions is Joe Renville, Bureau of Legal Services Attorney. We will keep you informed through future issues of this newsletter and other media as the revision process progresses. Check the "NR 149 Update" page on the DNR web site for more information. □

www.dnr.state.wi.us/org/es/science/lc/nr149

LabNotes**Newsletter of the Laboratory
Certification Program**

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LabNews

Laboratory Courses at Wisconsin Technical Colleges

Laboratory Analysis 1 offered March 5-7, 2002 at Moraine Park Technical College located in Fond du Lac, WI. To register call (920) 929-2100 or 1-800-221-6430.

Laboratory Analysis 2 offered April 8-9, 2002 at Northeast Wisconsin Technical College located in Green Bay, WI. To register call Maria DeBriyn at (920) 498-5497.

Check the Wisconsin DNR operator certification training web page and Wisconsin Rural Water Association web site for additional training opportunities. □

www.dnr.state.wi.us/org/es/science/opcert/training.htm
www.wrwa.org (Wisc. Rural Water Assoc.)

On-line Water Quality Technician Associate Degree

Moraine Park Technical College is offering an on-line associate degree program that includes "targeted instruction and practical experience through a unique offering of online Internet-based courses and on-the-job internship." Check the college's web site for course description, curriculum and on-line registration. □

www.moraine.tec.wi.us/academics/programs/watertechnician/index.shtml

National Water Quality Monitoring Conference to be Held in Madison

The National Water Quality Monitoring Council will hold its third national conference on May 21-23, 2002, at the Monona Terrace Community and Convention Center in Madison, Wisconsin. The overall theme of the 2002 conference is focused on: (1) Collaborative efforts; (2) New and emerging technologies; (3) Changing expectations of monitoring; and (4) sharing results and successes.

For the final conference agenda, registration information, and hotel accommodations, visit the Council's web page. □

www.nwqmc.org

New DHFS Environmental Publications

The Wisconsin Department of Health and Family Services has added three new factsheets to the Environmental Health Resources section of its web site. They are located under the "Human Health Hazards" topic with nine other titles. They are:

- Old Dumps and Landfills
- Former Manufactured Gas Plants
- Lead in Soil from Exterior Lead Paint

You can check out these additions at their web site. □

www.dhfs.state.wi.us/dph_beh/Env_Health_Resources/index.htm

NELAP Accreditation Update

Over 1,000 laboratories have received accreditation through the National Environmental Laboratory Accreditation Program (NELAP). The labs are from 38 states and territories and three foreign countries. Four of the labs are located in Wisconsin. For the most recent listing of labs, check the NELAC page on the U.S. EPA web site. □

www.epa.gov/ttn/nelac/accreditlabs.html

We've Moved

The Bureau of Integrated Science Services has moved to a new location. Formerly located in the GEF 2 building at 101 South Webster in Madison, most Bureau staff are now located approximately seven blocks southeast of the Capitol Square at 706 Williamson Street. The mailing address and staff phone numbers remain the same, but if you are stopping by to visit a staff person or to pick up materials you will need to be aware of the new building location and access procedures. □

Bioterrorism and Laboratory Services

With the events of September 11, 2001 and the recent anthrax letters there has been an increase in concern about bioterrorism. In the three weeks following the initial reports of anthrax tainted letters, the Wisconsin State Laboratory of Hygiene tested more than 375 environmental specimens for anthrax. All were negative.

The United States government has been concerned for some time about this threat. For this reason the federal government has made grants available for the last few years. Wisconsin has received a number of these grants to help prepare for biological terrorism. Both the Department of Health and Family Services and the State Laboratory of Hygiene have received these grants.

The Department of Health and Family Services (DHFS) has improved the communication network with the local public health departments. The communication network is called the "Health Alert Network." This network has two purposes: aid in rapid, reliable communication and allow for the training of local health providers.

The State Laboratory of Hygiene is a level C laboratory for responding to the biological agents of terrorism. The State Laboratory of Hygiene has been gearing up to do tests and training other laboratories. The State Laboratory along with three other labs (Milwaukee Health, Milwaukee VA Hospital and Marshfield Clinic) make up the state's level B response laboratory network. These four laboratories can test for the following agents:

- *Bacillus anthracis* (anthrax)
- *Yersinia pestis* (plague)
- *Francisella tularensis* (tularemia)
- *Brucella* spp. (brucellosis)
- *Burkholderia mallei* (glanders)

In addition, these four laboratories have trained another 130 health care provider laboratories (level A) with low-level biosafety facilities. These 130 laboratories have the capability of presumptive diagnosis of priority bioterrorism agents. These samples will then be forwarded to one of the four level B labs.

There are two level D (highest level) laboratories for bioterrorism in the U.S. These

are the Center for Disease Control (CDC) in Atlanta and the U.S. Army Medical Research Institute of Infectious Diseases, located at Fort Detrick, MD. These laboratories have highly specialized, maximum containment facilities to deal with rare diseases like smallpox or Ebola. They can also detect genetic recombinants in biological agents. □

Information on the Web:

CDC Web Site on Bioterrorism.

www.bt.cdc.gov

CDC Facts About Biological Agents.

www.bt.cdc.gov/documents/appcts_about.pdf

DHFS Web Site on Bioterrorism.

www.dhfs.state.wi.us/healthtips/bcd/bioterr.htm

State Lab's Information on Level A to D labs.

www.slh.wisc.edu/results/results_pdf/summer00.pdf

LC Program Taking Nominations for 2002 Registered Lab of the Year Awards

The laboratory certification program is accepting nominations for the 2002 Registered Lab of the Year Awards. The awards are presented annually to recipients in two categories: Small Facility (wastewater treatment plant labs with effluent flows less than 1 mgd, or labs that perform a limited array of tests), and Large Facility (wastewater treatment labs with effluent flows greater than 1 mgd, or labs that perform a wider array of more complex tests).

Nominees for Lab of the Year must be registered facilities located in the State of Wisconsin. Certified laboratories will not be considered. Anyone can nominate a lab for one of the awards (you don't have to be a DNR employee), but labs may not nominate themselves. There is no limit on the number of times that a lab may be nominated, and labs may be nominated for (or presented) an award in consecutive years. A nomination committee will decide award winners, and the awards will be presented to the winners at the March 2002 meeting of the Natural Resources Board at DNR's central office in Madison.

To nominate a laboratory for 2002 Registered Lab of the Year, contact Greg Pils at (608) 267-9564 or pilsg@dnr.state.wi.us for a nomination form. Completed nomination forms must be received by December 31, 2001. □

Quality Matters

By Donalea Dinsmore, DNR QA Coordinator

Some may remember 1986 when the Laboratory Certification Program began and the initial resistance to regulating laboratories. In the end, the assertion that DNR didn't have a reliable mechanism to determine the quality of compliance data proved to be a compelling argument for creating NR 149. The Certification Program has evolved since then and so has our understanding of what is involved in generating "quality" data.

Although it's been tempting to make the laboratory certification program responsible for data acceptance, certification and data acceptance are really separate functions. Department compliance programs retain responsibility for determining what quality data is needed for decision-making, communicating those needs, and deciding upon data acceptability. This separation creates issues that go beyond compliance with the rules for certification (NR 149).

The Department has benefited from involving the regulated community in the process of resolving conflicts. Data quality issues are no exception. I would like to establish a Quality Forum, an ad hoc group of laboratory professionals who are willing to invest time working on issues of mutual concern to DNR programs and laboratories. I propose beginning with two current issues: reporting detection limits for samples requiring dilution and standardizing data qualifiers. This group or a subgroup will also serve as a focus group as we continue developing NR 148; the data reporting rule. If you are interested in being part of the Quality Forum, please contact me by e-mail at dinsmd@dnr.state.wi.us or by phone at (608) 266-8948. □

Electronic Data Transfer

Where is the United States Postal Service for moving an electronic envelope from your Laboratory to your customer, or to the appropriate DNR Program? While such a service would be nice, it doesn't really exist. Several areas in the DNR and several labs have begun to develop such a service in a project called the Lab Portal Project.

The first part of the service is to agree on the content and format for the data to be contained in the "envelope." Ron Arneson, in the Environmental Science Services Section, has taken the lead to get folks together to develop the plan. Four labs recently agreed to pilot the creation of the data envelope and the process to transfer it to the department. They were provided two formats for the data, one is a flat file with tab-delimiters and the other is an XML format. Tab delimited flat files have been in use for many years. They are easy to create but hard to change. XML format files are a recent development evolving from the HTML coding of the Internet. It is somewhat more difficult to implement but is robust and adaptable for many types of data and transfer options. The laboratories were asked to review the data and the formats and provide comments and/or test data files to the department. For more information on this pilot effort check the link below.

www.dnr.state.wi.us/org/es/science/lslab_data/index.htm

The second part of the service is the means for actually transferring the data envelope. The Internet is the logical choice, but one could opt for using an e-mail attachment or a fully encrypted, PKI sealed document – or something in-between. Initially the pilot labs will use the e-mail attachment method while a more secure means is developed. The more secure means is being piloted by the Electronic Discharge Monitoring and Reporting project being led by Bob Weber, in the Bureau of Watershed Management. The EDMR project will pilot the use of the E-Business Directory operated by the new Department of Electronic Government. The E-Business Directory provides a mechanism for laboratory personnel, or anyone wishing to conduct electronic business with the state, to register and obtain logon credentials. The credentials will permit the person to enter a secure application and transfer files using common web upload tools. This represents the next step in a secure procedure for transferring data envelopes. For more information on this pilot check the link below.

www.dnr.state.wi.us/org/water/wm/ww/wwedmr.htm

It is hoped that these two pilots will lead to routine electronic data transmittal in a number of DNR programs. □

Council Notes – November 2001

By David Kollakowsky

One of the perks of being the Certification Standards Review Council Chair is the bully pulpit provided on a twice a year basis in the form of this LabNotes column. As I look over previous articles I have written for this publication there is a common theme running through all of them, specifically the request for feedback and participation by affected parties on business brought forward and debated by the Council. I am hoping phone calls and e-mail I receive are not representative of the level of interest in laboratory certification and registration issues in the State of Wisconsin. I trust people are obtaining their information from the Laboratory Certification web site or other means.

First I would like to take this opportunity to welcome Mr. Randy Herwig to the Council as the Small Municipal Wastewater Plant (<5 mgd) representative. Randy works for the village of Lodi. I was recently able to spend a couple of hours talking with Randy and I am certain he will represent his constituents well.

The Council has been very active over the last year. We have been holding the Laboratory Certification and Registration Program staff accountable for more detailed program information and improved audit performance than at anytime in the five plus years I have been a member of the Council. Regular audit status updates are now required and presented at every Council meeting. Registration/Certification fees are the same for fiscal year 2002 as you had for 2001.

In addition we have begun discussions on a variety of other topics related to laboratory certification such as improved communication and training opportunities. We recognize that there is an expectation among many of the participants in the Program that education and training are one of the roles Program staff should fill. We are looking at ways that this type of service might be provided.

Finally, there is the issue of NR 149 revisions. The Certification and Registration Program now has the official go ahead to proceed with the revision process. An Advisory Committee (AC) is being formed using the Council as the core of the membership. This was decided for a variety of reasons including the

need to keep the size of the AC relatively small and manageable and to reinforce the role of the Council as the focal point of contact for certification and registration issues. Now more than ever the Council is looking for your input and ideas concerning the direction and scope the rule making process should take. Several affected groups are already preparing their position and ideas.

Make a point to stay in contact and informed. Speaking for myself, I answer phone calls and e-mails promptly.

Thanks in advance for your response. □

Future Meeting Dates

The Certification Standards Review Council meets quarterly, typically in February, May, August and November. Check the link below for meeting dates, agendas and meeting minutes. □

www.dnr.state.wi.us/org/es/science/lc/council

Council Contact List

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Vacant

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Municipal Wastewater Plant (> 5 mgd)

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Municipal Wastewater Plant (< 5 mgd)

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Solid and Hazardous Waste Disposal Facility

Vacant

State Laboratory of Hygiene

Mr. George Bowman - (608) 224-6278

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PT Issues

Reference Sample Guidance Soon Available

The need for a comprehensive reference sample guidance document has been evident for some time. We're happy to inform everyone that one is on the way.

Authored by Laboratory Certification Program summer 2001 intern Ian Klemm, the most recent draft of the Reference Sample Guidance Document is undergoing final review, and the final version is expected to be ready for distribution within the next few weeks. When finalized, the document will be available immediately on the Program's Web site in downloadable PDF format under the "What's New" and "Publications" headings.

Printing and Mailing costs will prevent us from being able to provide all laboratories with a printed copy, but a limited number of printed copies will be available upon request. To request a copy once they are available, contact Phillip Spranger at (608) 267-7633 or spranp@dnr.state.wi.us. Laboratories and interested parties with Internet access are encouraged to download the document from the program's web site to help ensure that enough printed copies will be available for those parties without Internet access.

The document is 23 pages in length. We have attempted to address all rules and requirements pertaining to the reference sample program, but there's always room for improvement. If you have any comments, questions, or constructive criticism about the document and its contents, contact Greg Pils at (608) 267-9564 or pilsg@dnr.state.wi.us. □

DMR-QA 22

At this time, the U.S. EPA has not set the deadlines for DMR-QA 22. Do not analyze reference samples for DMR-QA 22 until after you have received official notification from EPA (the "308 letter" that includes all of the forms for submittal). Questions about DMR-QA, should be directed to Diane Drinkman at (608) 264-8950 or at drinkd@dnr.state.wi.us. □

WSLH Proficiency Testing in 2002

The Wisconsin State Laboratory of Hygiene (WSLH) Environmental Proficiency Testing (PT) Program will discontinue all organic proficiency testing samples starting in 2002. Due to the decrease in the number of laboratories who order the organic samples, it is no longer cost effective to provide this service. In addition, the Wisconsin DNR has approved other PT providers who offer these samples. The discontinuation will affect both the Environmental Reference (ER) program for certification and the Blind Standards (BS) program for quality assurance. The following samples will no longer be available starting in 2002:

<u>ER Code</u>	<u>BS Code</u>	<u>Name</u>
B1R	B1B	Nitrogen/Triazine Pesticides (no metabolites)
B2R	B2B	Organophosphorus Pesticides
B3R	B3B	Triazine Pesticides (including metabolites)
CHR	CHB	Chlorinated Acid Herbicides
CPR	CPB	Carbamate Pesticides
DOR	DOB	Diesel Range Organics (DRO)
GOR	GOB	Gasoline Range Organics (GRO) and PVOCs
HAR	HAB	Purgeable Halocarbons and Aromatics (VOCs)
HPR	HPB	PAH by HPLC
OPR	OPB	Organochlorine Pesticides
PBR	PBB	Polychlorinated Biphenyls (PCB)
PNR	PNB	Phenols
S1R	S1B	Nitrosamines and Nitroaromatics
S2R	S2B	PAH and Phthalates
S3R	S3B	Haloethers & Non-purgeable Chlorinated Hydrocarbons
TCR	TCB	2,4-D and Silvex only

The WSLH PT Program will continue to provide inorganic samples for both the Environmental Reference program to meet certification requirements for NR 149 and the Blind Standards program to meet quality assurance needs. The program will also continue to provide water microbiology samples to meet certification requirements for ATP 77 and to meet quality assurance needs.

A 2002 catalog reflecting the above changes was mailed in early October. If you have any questions or comments, please contact Barb Burmeister at (800) 462-5261, ext. 107. □

Wastewater Focus

Changes Underway for Regulating Mercury in Wastewater

Rule-making currently underway would require labs performing work for large and medium-sized wastewater facilities to measure total mercury in wastewater effluents down to below 1 ng/L.

The current draft of ch. NR 106 Wis. Adm. Code sets conditions that wastewater permittees must meet to obtain a variance to water quality standards. Besides wastewater testing, the rule requires permittees to implement pollutant minimization programs (PMPs). Previously, variances were not necessary because methods were not sensitive enough to adequately measure effluent total mercury concentrations at or near permit limits.

The draft rule specifies quality assurance measures beyond those that would normally apply according to the Laboratory Certification Rule (ch. NR 149). These measures are necessary to avoid contamination during sampling, sample handling and analysis. EPA methods form the basis for the quality criteria. These methods include *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels* and *Method 1631: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry*.

The EPA methods and the Department's draft ch. NR 106 take a performance-based approach in that only those procedures necessary to meet quality objectives for the sample being processed are required. Under this approach, the level of effort necessary would be dependent on the concentration of mercury in the particular sample of surface water, wastewater influent and effluent, or sludge. The draft rules allow a phase-in period for permittees and laboratories to gain experience generating low-level mercury data.

The Department will request permission from the Natural Resources Board at its January 2002 meeting to hold one or more public hearings on the draft rules in March 2002. Final promulgation of the rules are likely to occur around October 1, 2002. For further information, contact Tom Mugan at (608)266-7420 or

Update: Use of Freon for Oil and Grease Analysis

As has been anticipated for several months, the Federal Register (Volume 66, Number 212) recently published a notice that EPA is proposing regulatory changes that will prohibit new production or importation of CFC-113 (Freon) for use as the extraction solvent in oil and grease analyses, effective January 1, 2002. EPA methods affected by this decision include 413.1, 413.2, 418.1, and 9071A.

It's emphasized that this is a ban on production of CFC-113. Labs may continue to use stockpiled CFC-113 that was imported for production prior to January 1, 2001, as well as recycled CFC-113, for as long as EPA's Office of Water and Office of Solid Waste continue to accept results from test methods using it as the extraction solvent.

In light of this development, we here at the Wisconsin Laboratory Certification Program are encouraging laboratories certified or registered for the Freon Oil and Grease procedure to begin moving toward the procedure for Hexane Extractable Material (HEM) published in EPA method 1664, Revision A. Labs are reminded that the HEM procedure is an entirely different certification/registration than the Freon procedure, and that they must apply for and be granted certification/registration for this test before it can be performed for regulatory compliance.

There are several key differences between the HEM and traditional Freon extraction procedures. Method 1664 and several supplementary materials, including fact sheets and an FAQ compendium, are available from EPA's web site (see link below). Contact Greg Pils at (608) 267-9564 or pilsg@dnr.state.wi.us if you have any questions about method specifics, and contact Phillip Spranger at (608) 267-7633 or spranp@dnr.state.wi.us if you have questions about applying for HEM certification or registration. □

www.epa.gov/ost/methods/oil.html

Update: TOX is not the same as TOC

Many industrial facilities, especially pulp and paper mills, are seeing total organic halides (TOX) appearing on their revised WPDES

permits as a result of the recently promulgated EPA Pulp and Paper "Cluster Rule." In turn, laboratories will be getting requests to perform this testing.

Although the TOX test procedure is similar to the test procedure for total organic carbon (TOC), they are indeed different tests, and labs must be certified or registered specifically for TOX testing before they can perform the test for regulatory compliance. EPA method 1650 should be cited when performing TOX analysis.

Contact Phillip Spranger at (608) 267-7633 or spranp@dnr.state.wi.us if you have questions about applying for TOX certification or registration. □

Influent Quality Control

A deficiency frequently found during on-site evaluations of laboratories is the failure to analyze replicates and calculate precision limits for influent parameters. If influent BOD₅, TSS, ammonia, or phosphorus test parameters are on your facility's discharge monitoring report (DMR), you are required to analyze at least 1 replicate every 20 influent samples and generate influent precision limits. Although influent test parameters tend not to have permit limits, the quality of this information submitted to the Department is still important. Section NR 149.14 (3)(e) Wis. Adm. Code states, "A replicate sample shall be run after the analysis of 20 samples for each matrix type unless the methodology specifies otherwise." While some may consider influent samples the same matrix as effluent samples—it's all wastewater isn't it—they are really quite different. Hold a beaker full of each up to the light to convince yourself of this.

If influent ammonia or phosphorus test parameters appear on your DMR, you need to also analyze influent spikes every 20 samples and generate influent accuracy limits for these tests. Ammonia influent samples for example, have more impurities than the plant's ammonia effluent samples (more matrix interferences). This generally means that influent accuracy limits tend to be less stringent than effluent accuracy limits. This is normal and to be expected.

Regardless of whether influent sampling is required, it is recommended that laboratories analyze replicate spikes and generate precision limits for all test parameters. □

A Note about Falsification

We have recently encountered several instances of data falsification. Falsifying data is one of only a handful of explicit violations that can lead to revocation of a laboratory's certification or registration. The Department takes a particularly strong position against falsification in any form, and historically a Notice of Violation (NOV) is issued through the Bureau of Environmental Enforcement. In severe cases, such as "dry-labbing" or reporting results when no actual testing was performed, the operator can lose his or her license.

What is falsification? Perhaps the most relevant listing in the dictionary—at least for our purposes—defines the word falsify as, "to make untrue statements." That's a pretty broad definition, but in practice, falsification is a spectrum covering the range from a single falsified piece of information through complete falsification of all data generated.

All of the recent cases involved falsification of temperature measurements. In each case, temperatures were written down without actually reading the thermometer. We realize that the mundane chore of reading and recording the temperature from a thermometer in each autosampler and any laboratory refrigerator each day pales in comparison to the rest of a typical wastewater operator or laboratory analyst's workload.

While it may seem an insignificant task, the temperature at which samples are held does affect many of the analytical parameters being monitored. Temperature-based preservation requirements are designed to minimize microbial activities that will compromise sample integrity. Therefore, if samples are not collected and maintained at 4°C, microbial action can begin. Ultimately this results in a low bias of the final data. To the Department, low bias means the potential that a sample could exceed permit limits or environmental standards.

Why is falsification occurring? To combat this or any other problem, we have to understand the reasons behind the action. In virtually every case, it boils down to one basic problem—insufficient time. It is generally recognized that most operators are responsible for more than just wastewater plant operation, including laboratory analyses. Operators are frequently charged with

street cleaning, snowplowing, and public lawn care. In many cases, municipal government officials place a great deal of pressure on wastewater operators to occupy their time with these tasks that make them visible to the general public.

Proper laboratory testing and documentation are critical. The Laboratory Certification Program can and has taken steps to notify municipal authorities that proper attention must be paid to laboratory testing. Talk to your auditor and let him or her know if there is any concern regarding inadequate support for the time required to perform laboratory testing to meet the standards of NR 149. Bear in mind that it is not the operator that is being evaluated during an audit, rather it is an audit of the municipality's capability to perform testing in compliance with the requirements of the Laboratory Certification and Registration Program. □

Filling Out DMRs

Failure to qualify data on discharge monitoring reports (DMRs), while improving, remains a common deficiency cited in laboratory audit reports (see the Spring 2001 edition of LabNotes). Beyond data qualification, however, there are a number of other reporting requirements that occasionally are not met:

- If more than one sample was analyzed on a particular day (e.g., pH, residual chlorine), write in the highest value. If the minimum value of a pollutant is of concern (e.g., DO), write in the lowest value. This does not apply to replicates! For replicates, generally report the average of the two results. Replicates really relate to a single sample.
- Be sure to report the number of times a specific limit was exceeded in the appropriate box.
- When the result is less than the LOD (Limit of Detection), write in "<" followed by the value of the LOD. Do not report "ND".
- You must report the LOD and LOQ if you report results for ammonia or residual chlorine.
- You must provide the 9-digit laboratory certification number associated with the laboratory that did the testing for each

reportable parameter. If any analyses are subcontracted to another certified laboratory, be sure to write in the certification number of the subcontract laboratory in the box under each parameter that was subcontracted.

- Make sure "greater than" signs (>) do not look like the numeric seven (7). □

Quality Assurance Plans

A number of facilities still wave a copy of the DNR publication entitled "Quality Assurance Document for a Small Wastewater Laboratory", and offer it as their very own QA Plan. There are a number of variations on this theme, the most common of which is to make minor strikeouts changes to the original document and then submit it as the facilities own quality assurance plan.

Please remember that the publication "Quality Assurance Document for a Small Wastewater Laboratory" is a guidance document only. It's only purpose is to serve as a model upon which each facility should base its own QA plan. This issue was discussed in greater detail in the Fall 1999 edition of LabNotes.

What's the bottom line? Each facility needs to create a dynamic quality assurance document that indicates how analyses are conducted and evaluated in their specific facility. While these documents should be revised frequently to reflect changes incorporated by the laboratory, certainly they should be revised to reflect changes that are inevitably required following an on-site evaluation. □

Clarification of Total Suspended Solids Re-dry & Re-weigh Procedure

A number of laboratories have called with questions about the correct interpretation of the following statement as it relates to TSS analysis:

Repeat the cycle of drying, cooling, desiccating and weighing until a constant weight is obtained or until the weight change is less than 4% of the previous weight or 0.5 mg, whichever is less.

Analysts want to know what specific "weight" is being referenced. The answer is that the weight in question is the actual balance reading. If you are using a crucible, that weight might be 25.xxxx grams or more. If using an

aluminum weight dish containing the dried filter, the value maybe 1.xxxx to 2.xxxx grams. Finally, if only the filter itself is weighed, the reading would typically be about 0.8xxx grams.

To simplify things even further, in virtually every case the criterion for maximum allowable weight change will be 0.5 milligram (0.0005 grams). This is because in order for “4% of the previous weight” to be less than 0.0005 grams, the actual weighing would have to be less than 0.0125 grams (4% of 0.0125 g = 0.0005 g). The program is not aware of any TSS filters that

weigh less than about 200 milligrams (0.2000 g).

In the influent example below, when determining whether the 2nd weighing has reached constant weight, the “previous weight” refers to the “1st weighing”, or 1.4543 grams. Four percent (4%) of this value would be 0.0582 grams. Since 0.0005 grams (0.5 mg) is less than 0.0582 grams, then the criterion for maximum allowable weight change is 0.0005 grams. In this case, the actual weight change (0.0015 grams) exceeded that criterion, and a third re-dry/re-weigh cycle was required. □

Crucible/filter ID		Influent (Raw)	Effluent (Final)
Volume Filtered (mLs)		D	J
Crucible/Filter AFTER drying (g)			
	1 st weighing	1.4543	1.5211
	2 nd weighing	1.4528	1.5210
	weight change (g)	0.0015	0.0001
	lesser of: 4% of 1st weight or 0.5mg (0.0005g)	<input type="checkbox"/> 0.0582 <input checked="" type="checkbox"/> 0.0005	<input type="checkbox"/> 0.0608 <input checked="" type="checkbox"/> 0.0005
	Analysis	MUST re-dry & re-weigh	Sample is dry
	3rd weight	1.4529	
	weight change (g)	0.0001	
	lesser of: 4% of 1st weight or 0.5mg (0.0005g)	<input type="checkbox"/> 0.0581 <input checked="" type="checkbox"/> 0.0005	
	Analysis	Sample is dry	
Crucible/Filter tare weight (g)			
	1st weight	1.4517	1.5197
	2nd weight	1.4517	1.5196
	weight change (g)	0.0000	0.0001
	lesser of: 4% of 1st weight or 0.5mg (0.0005g)	<input type="checkbox"/> 0.0581 <input checked="" type="checkbox"/> 0.0005	<input type="checkbox"/> 0.0608 <input checked="" type="checkbox"/> 0.0005
	Analysis	Sample is dry	Sample is dry
Weight of dry solids (mg)		1.2	1.4
TSS (mg/L)		240	2.8

Groundwater

Boron? Important?

Who would have thought that boron, with a preventative action limit (PAL) of 190 ug/L would be a critical parameter for decision-making? In recent months, questions about the integrity of boron results in groundwater samples threatened to delay proposed landfill expansions. Hydrogeologists responsible for the sites in question needed to decide whether the results were sufficient to grant PAL exemptions for the

site and if so, use the data set to calculate alternate concentration limits (ACLs).

Because boron occurs naturally in some groundwater formations, part of the consideration was whether the high boron concentrations being observed were “real,” an artifact of contamination leached from contact with glass, or a little of both. The decisions were complicated by high variability in the results, a limited number of

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Boron, continued.

data points, and incomplete field blank information.

Pay Attention to Preservation

As potential sources of sample contamination were investigated, it was determined that the collection protocol and sample container did not use any glass materials and laboratory method blanks were relatively free of boron. However, the laboratory supplied acid preservative in glass ampules. The acid preservative contributed between 50 and 100 ug/L of boron depending on the sample volume collected. At one landfill site, when the bias was considered, the results were consistent with historical data and there was no need for a PAL exemption. At the other landfill, field staff were aware of the potential contamination problems and used their own "clean" acid.

It's noteworthy that had field blanks been collected with each sample set, landfill and DNR staff could have seen the sample bias, but unless action was taken to determine the sources of contamination and eliminate them, the sample bias problems would have persisted.

Solutions

The obvious solution is to use a low boron acid to preserve groundwater samples. However, implementing this solution may present practical problems. For example, field crews may be hesitant to handle larger volumes of acid and request that their contract-laboratory supply pre-measured aliquots. For laboratories that provide commercially prepared acid ampules in sample kits, finding a supplier that uses plastic ampules may prove challenging. Preparing ampules in the laboratory can be costly and time-consuming.

If the logistics problems in field preservation cannot be overcome, the solution may be to preserve field-filtered samples in the laboratory. As with other metals samples, when the laboratory preserves the samples, it must have documentation that sample analysis was delayed at least 16 hours following preservation. In the time between collection and preservation, iron and other metals may precipitate from solution. The laboratory must then take care to assure that the precipitate is redissolved. Remember that groundwater samples should not be filtered in the laboratory. Any filtration must be done in the field as the sample is collected. □

Feature Article***In Defense of Professional Judgment***

Alfredo Sotomayor, Senior Audit Chemist

In our regulated world of laboratory standards, procedures, and checklists it is not always obvious how much professional judgment chemists, technicians, and quality assurance officers exercise. It may seem clearer that laboratory auditors do and have to exercise professional judgment, although there are those that advocate that assessors should stick to just the facts, thanks. As if the facts were just that! In this article I will explore the nature of professional judgment, what I am calling the PJ factor. I will not explore professional judgment in laboratory audits now (that may be the focus of a future article). Here, I want to concentrate on what PJ means in the context of environmental laboratories.

Rules, methods, and procedures attempt to specify conditions and criteria that help achieve

uniformity among all that are covered by them or use them. Not much judgment exists in a directive such as this one, from Method 507: "Add 300 mL methylene chloride to the sample bottle, seal, and shake 30 times to rinse the inner walls." However, not even the most carefully written set of rules or methods can account for all eventualities, as this, also from Method 507, acknowledges: "...the experience of the analyst should weigh heavily in the interpretation of chromatograms. Identification requires expert judgment when sample components are not resolved chromatographically." And if we consider that laboratory personnel deal with many methods that are self-proclaimed guidance, conflicting requirements imposed by different clients and regulatory agencies, and samples that refuse to yield to conventional treatment, then we can understand that opportunities for judgment are not that uncommon.

Exercising expert judgment requires the services of seasoned professionals with the right skills and disposition. These two, skills and disposition, combined form the PJ Factor.

According to Peter A. Facione, professional judgment is synonymous with what educators call “critical thinking” when the latter is exercised in a professional setting. Dr. Facione believes that exercising professional judgment requires one to be “willing and able” to do it.

$$PJ = CTs + CTd$$

Dr. Facione identifies six critical thinking skills (what I am calling CTs), the “able” part of professional judgment: interpretation, analysis, evaluation, inference, explanation, and self-regulation. If you have interpreted chromatograms, chosen between two different methods for determining the same analyte, predicted consequences from test data, justified the methods and procedures you have used for a client, or reviewed your own conclusions to confirm them or correct them, you have applied critical thinking skills and therefore, you have exercised some professional judgment.

Convincing arguments have been made suggesting that critical thinking skills can be acquired through well-developed courses and judicious study. This is primarily the stuff of training. Good training courses and programs are rich in content. The best ones go beyond content and explore its applications and implications. In other words, they promote critical thinking about their subject matter. But what about the “disposition” towards critical thinking?

To once again follow Dr. Facione’s model, the disposition toward critical thinking (my CTd) is best exemplified by a series of attributes exhibited by the mind inclined to think critically. An individual who is inquisitive, judicious, truth seeking, systematic, analytical, open-minded, and confident in reasoning is more disposed to thinking critically.

This “willing” part of professional judgment and critical thinking is a little bit more elusive. It requires an auspicious culture to flourish, but thrive it must if an institution relies on professional judgment. At this level, we catapult ourselves from the realm of training to the broader field of education, which emphasizes molding habits and behaviors, beyond the more narrow focus of content training. There is a difference between analyzing a sample and being analytical, offering an interpretation and being open minded or forwarding explanations and being truth seeking. Dispositions toward critical

thinking, when fully realized, culminate in exemplary states of being.

No Correlation

Research conducted by Dr. Facione and others strongly suggests that ability and disposition toward critical thinking are not correlated. This may seem surprising at first, but it is as plausible for someone that has been blessed with an innate sense of rhythm and musicality not to become a dancer, as it is for an athlete with a great desire to be a quarterback not to have the necessary skills to play professionally. Therefore, developing professional judgment requires strengthening two fronts.

Since we cannot, nor is it desirable to, eliminate professional judgment, what can laboratories do to strengthen and validate it? Some measures are fairly obvious: hire and retain personnel with the right qualifications and credentials, verify that people performing sophisticated tests have commensurate education and experience, document credentials and keep files of demonstrations of competence performed by those who do testing.

The Wisdom to Judge

To effectively promote professional judgment, laboratories must encourage critical thinking for all personnel. Those in charge of supervising and training should develop programs and exercises that emphasize critical thinking skills. When an analyst reads and understands an SOP, she is functioning at the basic content level. When she is asked to revise an SOP by reading five different approved methods, and is asked to justify the choices that make it into the SOP, she is using critical thinking skills. An effective means of promoting critical thinking skills is to use “case studies” as part of training. In environmental laboratories, data packages selected purposefully from different projects and clients serve very well as case studies.

To foster the necessary disposition toward critical thinking, laboratories need visionary leaders who promote behavior exhibiting that disposition. Establishing apprenticeship programs that pair novices with experienced professionals who value critical thinking, and promoting and rewarding those that successfully complete such

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Professional Judgment, continued.

programs can help. Documenting decisions arrived at through professional judgment helps establish the necessary record and can be an invaluable training tool. Many experts also agree that establishing a code of ethics, at both the professional and institutional level, is an excellent means of fostering a disposition toward critical thinking. I hope that the recent interest in training laboratory personnel in ethical practices results in a cadre of professionals correctly disposed to exercise judgment.

Even though judgment is not “black and white,” it does not have to be arbitrary. And just because it is exercised “case by case” does not mean that it has to lack consistency? When judgment is truly of the “professional kind,” it is engaging, thoughtful, considerate, appropriate, and mindful of consequences. And what can be wrong with all of that? □

Regulatory Update

Clean Water Act

Guidelines Establishing Test Procedures for the Measurement of Mercury in Water (EPA Method 1631, Revision C); Final Rule, Technical Corrections Published June 18, 2001.

EPA is amending the “Guidelines Establishing Test Procedures for the Analysis of Pollutants” to make minor technical corrections to rectify an omission in the text of the promulgated version of Method 1631: Mercury in Water by Oxidation, Purge and Trap and Cold Vapor Atomic Fluorescence Spectrometry.

These technical corrections were effective July 18, 2001.

Guidelines Establishing Test Procedures for the Analysis of Pollutants; Analytical Methods for Biological Pollutants in Ambient Water. Published August 30, 2001.

This proposed regulation would amend the “Guidelines Establishing Test Procedures for the Analysis of Pollutants” under section 304(h) of the Clean Water Act (CWA), by adding several analytical test procedures for enumerating the bacteria, *Escherichia coli* (*E. coli*) and enterococci, and the protozoans, *Cryptosporidium* and *Giardia*, in ambient water to the list of Agency-approved methods. This

proposal would make available a suite of Most Probable Number (MPN) (i.e. multiple-tube, multiple-well) and membrane filter (MF) methods for enumerating *E. coli* and enterococci bacteria in ambient water. Similarly, this document proposes new methods for detecting *Cryptosporidium* and *Giardia* in ambient water.

Comments were due October 29, 2001.

Guidelines Establishing Test Procedures for the Analysis of Pollutants; Whole Effluent Toxicity Test Methods; Proposed Rule, published September 28, 2001.

EPA proposes to ratify its approval of several analytic test procedures measuring “whole effluent toxicity,” which the Agency standardized in an earlier rulemaking. The proposed changes are intended to improve the performance of whole effluent toxicity (WET) tests, and thus increase confidence in the reliability of the results obtained using the test procedures.

Comments on this proposal must be postmarked, delivered by hand, or electronically mailed on or before November 27, 2001.

Guidelines Establishing Test Procedures for the Analysis of Pollutants; Measurement of Mercury in Water; Revisions to EPA Method 1631; Proposed Rule, published October 9, 2001.

By this action, EPA is proposing modifications to EPA Method 1631, Revision C: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry Method 1631C, which measures mercury in aqueous samples. The proposed modifications would require use of certain “clean techniques” and quality control requirements when using this test method. The proposed modifications are intended to improve performance of EPA Method 1631C by reducing opportunities for contamination during sample collection and analysis.

Comments must be postmarked, delivered by hand, or electronically mailed on or before December 10, 2001.

Safe Drinking Water Act

National Primary Drinking Water; Filter Backwash Recycling Rule; Final Rule, Published June 8, 2001.

In this rule, EPA is finalizing the Filter Backwash Recycling Rule (FBRR). The purpose

of the FBRR is to further protect public health by requiring public water systems (PWSs), where needed, to institute changes to the return of recycle flows to a plant's treatment process that may otherwise compromise microbial control.

This regulation was effective August 7, 2001.

Unregulated Contaminant Monitoring Regulation for Public Water Systems; Amendment to the List 2 Rule and Partial Delay of Reporting of Monitoring Results. Published September 4, 2001.

In this direct final rule, EPA is correcting an omission in the January 11, 2001, List 2 UCMR concerning laboratory certification. This correction will automatically approve laboratories of public water systems, that are certified to conduct compliance monitoring using Method 515.3, to also use Method 515.4 for UCMR analyses. Additionally, EPA is delaying requirements for the electronic reporting of unregulated contaminant monitoring results until its electronic reporting system is ready to accept data. This action does not delay or suspend the implementation of any of the requirements of the Unregulated Contaminant Monitoring Regulations for sample collection and analysis on the previously established schedule.

This rule is effective on November 5, 2001, without further notice, unless EPA receives adverse comment by October 4, 2001. If such comment is received, a timely withdrawal will be published in the Federal Register informing the public that this rule will not take effect.

Resource Conservation & Recovery Act

Correction to Hazardous Waste Identification Rule (HWIR): Revisions to the Mixture Rule; Proposed Rule, Published October 3, 2001.

EPA is approving two clarifying revisions to the mixture rule. The first revision reinserts certain exemptions to the mixture rule which were inadvertently deleted. The second revision clarifies that mixtures consisting of certain excluded wastes (commonly referred to as Bevill wastes) and listed hazardous wastes that have been listed solely for the characteristic of ignitability, corrosivity, and/or reactivity, are exempt once the characteristic for which the hazardous waste was listed has been removed.

Written comments were due to EPA by November 2, 2001. □

Drinking Water Update

Disinfection Byproduct Certification

Laboratories may now apply for certification to perform testing for disinfection byproducts (bromate, chlorite and haloacetic acids (five) (HAA5)) for Safe Drinking Water Act compliance. Beginning in 2002, nineteen Wisconsin water suppliers will be required to conduct quarterly monitoring for these analytes. Additional facilities will be required to begin monitoring in 2004.

Laboratories interested in becoming certified to perform these tests should contact Phillip Spranger for more information at (608) 267-7633 or spranp@dnr.state.wi.us. The general requirements include:

- Complete and submit a revised application for laboratory certification (Form 4800-002 Rev 10/01).
- Submit the revised application fee of \$141.00.
- Submit the category 18 test category fee of \$940.00 (required only if the laboratory is not currently certified to perform SDWA analyses).
- Submit additional analyte-specific information with the application, including:
 - ✓ Acceptable results on performance evaluation (PE) samples from a Wisconsin-approved provider analyzed no more than six months prior to the date of application.
 - ✓ Acceptable method detection limit studies.
 - ✓ Initial demonstrations of capability as outlined in each method's QA section.

Laboratories will also be required to successfully complete an on-site evaluation and resolve any deficiencies identified during the evaluation prior to being granted certification to perform analyses for Safe Drinking Water Act compliance. □



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